

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開平10-66305

(43) 公開日 平成10年(1998) 3月6日

(51) Int.Cl. ⁸	識別記号	庁内整理番号	F I	技術表示箇所
H 0 2 K 9/06			H 0 2 K 9/06	C
H 0 1 L 23/36			9/02	B
H 0 2 K 9/02			9/22	Z
9/22			H 0 1 L 23/36	Z

審査請求 未請求 請求項の数3 F D (全 5 頁)

(21) 出願番号 特願平8-241065

(22) 出願日 平成8年(1996) 8月23日

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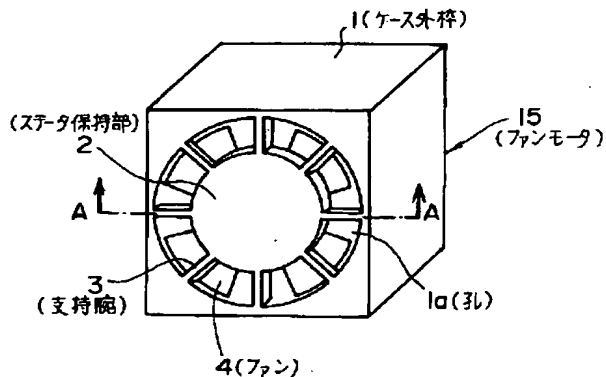
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(54) 【発明の名称】 ヒートシンク機能付きファンモータ

(57) 【要約】

【課題】 冷却装置になるCPU等などの半導体部品が発生する熱を熱伝導を利用して効率的に放熱すると同時に電子部品が収容される筐体内空気も排気できるようにしたヒートシンク機能付きファンモータを提供する。

【解決手段】 ケース外枠1は、熱伝導性の材料、例えばアルミニウムによって構成されている。ステータ保持部2は、熱伝導性材料で構成された複数の支持腕3によりケース外枠1に固定されている。ロータの回転によりファン4が空気流を排気するとともにケース外枠1に熱的に結合された発熱部品の熱がケース外枠1を伝導し、支持腕3に達し支持腕3はヒートシンクのフィンの役割を果たし、ケース外枠1を冷却する。



【特許請求の範囲】

【請求項1】 中央部に孔を有する略四角の形状で、熱伝導性材料を用いたヒートシンク機能を有するケース外枠と、
前記ケース外枠の前記孔に配置され、ステータを収容したステータ保持部と、
前記ステータ保持部に回転可能に取り付けられたロータと、
前記保持部の外周縁に一体に設けられ、その断面形状がモータ軸の直角面に対し一定の傾きを有する、熱伝導性材料を用いた複数の支持腕とからなり、
前記ロータのファンにより発生させた空気流の流れをモータ軸方向に平行になるように前記支持腕で整流して排気するとともに前記ケース外枠に熱的に結合した発熱部品の熱を前記支持腕に伝導させ前記支持腕を前記空気流により冷却することを特徴とするヒートシンク機能付きファンモータ。

【請求項2】 前記熱伝導性材料はアルミニウムまたは銅である請求項1記載のヒートシンク機能付きファンモータ。

【請求項3】 前記ケース外枠の1以上の辺をモータ軸方向に延長してなる延長部を設け、前記延長部は熱伝導性材料またはヒートパイプにより構成したことを特徴とする請求項1記載のヒートシンク機能付きファンモータ。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、CPU等などの半導体部品の放熱を直に行うとともに筐体内の空気流も排気することを考慮したヒートシンク機能付きファンモータに関する。

【0002】

【従来の技術】携帯型パーソナルコンピュータの高性能化、部品の高密度実装化に伴い、温度上昇に関して問題が生じる。その1つはケース内に収容されている各部品の自己発熱による各部品自体の温度上昇である。さらにケース内で各部品が発する熱および内蔵形周辺装置の発熱によるケース内温度の上昇である。前者の場合にはヒートシンク、ヒートパイプ、伝熱性ケース材料を用いて熱を拡散する方法が講じられている。また、後者の場合には小形ファンモータによって排気する構造が採用されている。

【0003】

【発明が解決しようとする課題】しかしながら、今後ますます、携帯型パーソナルコンピュータ内の高性能化による各部品の発熱量の増大、内部温度の上昇傾向があり、上記のようにヒートシンク、伝熱性ケース材料を用いたり、ケース内排気のための小形ファンモータを用いたりすることだけでは対応できなくなっている。そこで、小型で高性能、かつ安価な冷却装置の出現が要請

されている。本発明の課題は、冷却対象となるCPU等などの半導体部品が発生する熱を熱伝導を利用して効率的に放熱すると同時に電子部品が収容される筐体内空気も同時に排気できるようにしたヒートシンク機能付きファンモータを提供することにある。

【0004】

【課題を解決するための手段】前記課題を解決するために本発明によるヒートシンク機能付きファンモータは、中央部に孔を有する略四角の形状で、熱伝導性材料を用いたヒートシンク機能を有するケース外枠と、前記ケース外枠の前記孔に配置され、ステータを収容したステータ保持部と、前記ステータ保持部に回転可能に取り付けられたロータと、前記保持部の外周縁に一体に設けられ、その断面形状がモータ軸の直角面に対し一定の傾きを有する、熱伝導性材料を用いた複数の支持腕とからなり、前記ロータのファンにより発生させた空気流の流れをモータ軸方向に平行になるように前記支持腕で整流して排気するとともに前記ケース外枠に熱的に結合した発熱部品の熱を前記支持腕に伝導させ前記支持腕を前記空気流により冷却するように構成してある。前記熱伝導性材料はアルミニウムまたは銅で構成することができる。前記ケース外枠の1以上の辺をモータ軸方向に延長してなる延長部を設け、前記延長部は熱伝導性材料またはヒートパイプにより構成することができる。

【0005】

【作用】上記構成によれば、ケース外枠に結合した発熱部品は熱伝導によりケース外枠から支持腕に伝導し排気とともに排気流によって冷却される。したがって、筐体内の排気と同時に発熱部品を冷却するので、筐体内の排気および各部品の発熱を効率的に放熱することができ、小形で高性能、かつ安価なファンモータを実現できる。

【0006】

【発明の実施の形態】以下、図面を参照して本発明の実施の形態を詳しく説明する。図1は、本発明によるヒートシンク機能付きファンモータの実施の形態を示す斜視図、図2は、図1を一部断面で示した側面図である。ケース外枠1は四角の箱型形状であり、例えば、アルミニウムや銅などの熱伝導性の良好な材料が用いられる。ケース外枠1の中央部の孔1aには、ステータを収容したステータ保持部2が配置され、ステータ保持部2は一体に設けた8個の支持腕3によりケース外枠1に固定されている。支持腕3もケース外枠1同様にアルミニウムや銅などの熱伝導性の材料が用いられる。

【0007】ロータ5は、ステータ保持部2に回転可能に支持されている。ロータ5の回転によりファン4は、図2の矢印方向に空気流を排出する。ケース外枠1に冷却すべき半導体部品などを熱的に結合することにより半導体部品から発した熱はケース外枠1を伝導し、支持腕3に達する。支持腕3はケース外枠1のヒートシンク機能におけるフィンの役目を果たすもので、ファン4によ

る空気流により冷却され、ケース外枠1からの熱を放出する。

【0008】図3は、ファンと支持腕の断面形状およびその位置関係を示す図である。動翼であるファン11と静翼である支持腕12とは、図に示すような位置関係および断面形状にしてある。ロータの回転方向に対し矢印14の方向に空気流の流れは発生し、支持腕12によりモータの軸方向とほぼ平行な方向13に曲げられる。モータ軸の直角面に対する角度 θ によってその風量を調整できる。このようなファン11および支持腕12の断面形状および支持腕12を所定の角度に設定することにより風の流れを良くし、ファンの特性を15～30%改善することができる。

【0009】図4は、本発明における静翼構造と通常のモータの静圧-風量の関係を示す特性図である。A、Bは本発明によるヒートシンク機能付きファンモータの静翼構造の特性図であり、Cは従来のモータの特性図である。図4から明らかなように同じ静圧に対しA、Bの静翼構造の方が従来のモータの特性Cより風量が大きくなっていることが理解できる。図5は、図1のヒートシンク機能付きファンモータの使用例を示す図である。コンピュータケース8の一面に図1のモータ15が矢印方向にケース内空気を排出するように取り付けられている。モータ15のケース外枠の下面に熱伝導板6の一端が熱的に結合され、他端に発熱部品7が熱的に結合されている。

【0010】ファンモータ本来の目的であるパーソナルコンピュータケース8内の排気を行うとともに発熱部品7が発する熱を熱伝導板6を矢印10のように伝導することにより冷却することができる。従来、発熱部品7に必要であった比較的大きめのヒートシンクは必要なくなり、効率的に部分冷却および排気が可能となる。

【0011】図6は、本発明によるヒートシンク機能付きファンモータの他の実施の形態を示す斜視図である。この実施の形態は、ケース外枠16の下辺をモータ軸に平行に外枠延長部20を延ばしたものである。外枠延長部20の先端部に図5で示したように発熱部品を熱的に結合できるようにしたものである。ステータ保持部17、支持腕18、ファン19などの他の構成部分は図1と同じである。外枠延長部20およびケース外枠16には長溝20a、16aが形成され、これら外枠延長部20

0、ケース外枠16の表面積を増加することにより、さらに放熱効果を高めている。上記実施の形態では、外枠延長部20に熱伝導性材料を用いているが、ヒートパイプを用いても良い。

【0012】

【発明の効果】以上説明したように本発明は、中央部に孔を有する略四角の形状で、熱伝導性材料を用いたヒートシンク機能を有するケース外枠と、ケース外枠の孔に配置され、ステータを収容したステータ保持部と、ステータ保持部に回転可能に取り付けられたロータと、保持部の外周縁に一体に設けられ、その断面形状がモータ軸の直角面に対し一定の傾きを有する、熱伝導性材料を用いた複数の支持腕とから構成し、ロータのファンにより発生させた空気流の流れをモータ軸方向に平行になるように支持腕で整流して排気するとともにケース外枠に熱的に結合した発熱部品の熱を支持腕に伝導させ支持腕を空気流により冷却することにより、小型で、かつ高性能（高効率）な排気およびヒートシンク機能を有するファンモータを実現できる。

【図面の簡単な説明】

【図1】本発明によるヒートシンク機能付きファンモータの実施の形態を示す斜視図である。

【図2】図1を一部断面で示した側面図である。

【図3】静翼と動翼の関係を示す図である。

【図4】静翼構造モータと通常モータの静圧-風量の特性図である。

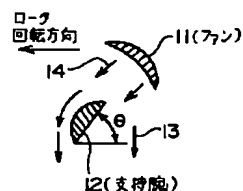
【図5】図1のヒートシンク機能付きファンモータの使用例を示す図である。

【図6】本発明によるヒートシンク機能付きファンモータの他の実施の形態を示す斜視図である。

【符号の説明】

- 1, 16…ケース外枠
- 2, 17…ステータ保持部
- 3, 12, 18…支持腕
- 4, 11, 19…ファン
- 5…ロータ
- 6…熱伝導板
- 7…発熱部品
- 8…コンピュータケース
- 15…ファンモータ
- 20…外枠延長部

【図3】



【図5】



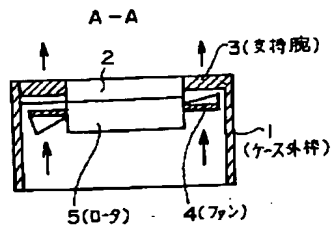
Figure 1 is a line graph with two y-axes. The x-axis is labeled '風量 [1/min]' and ranges from 0.00 to 60.00. The left y-axis is labeled '静圧 [mmAq]' and ranges from 0.00 to 5.00. The right y-axis is labeled '回転数 (r.p.m.)' and ranges from 0 to 14,000. There are six data series: A (solid circles), B (solid triangles), C (solid squares), A' (open circles), B' (open triangles), and C' (open squares). Series A, B, and C represent static pressure, while A', B', and C' represent rotation speed. Series A and B show a steady decrease in static pressure as flow rate increases. Series C shows a sharp drop in static pressure around 18 1/min, then levels off. The rotation speed series show an initial increase followed by a slight decrease or leveling off.

風量 [1/min]	A 静圧 [mmAq]	B 静圧 [mmAq]	C 静圧 [mmAq]	A' 回転数 (r.p.m.)	B' 回転数 (r.p.m.)	C' 回転数 (r.p.m.)
0.00	3.30	3.50	3.50	12,000	12,000	12,000
10.00	2.40	2.50	2.40	13,500	13,000	13,000
20.00	1.30	1.30	0.90	13,000	12,500	12,500
30.00	0.90	0.90	0.60	12,500	12,000	12,000
40.00	0.40	0.40	0.20	12,000	11,500	11,500

【補正内容】

(5)

特開平10-66305



【手続補正2】

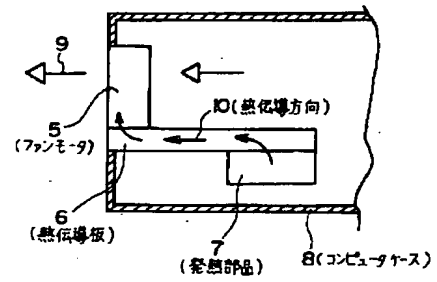
【補正対象書類名】図面

【補正対象項目名】図5

【補正方法】変更

【補正内容】

【図5】



PATENT ABSTRACTS OF JAPAN

(11)Publication number : 10-066305

(43)Date of publication of application : 06.03.1998

(51)Int.Cl.

H02K 9/06

H01L 23/36

H02K 9/02

H02K 9/22

(21)Application number : 08-241065

(71)Applicant : NIPPON KEIKI SEISAKUSHO:KK

(22)Date of filing : 23.08.1996

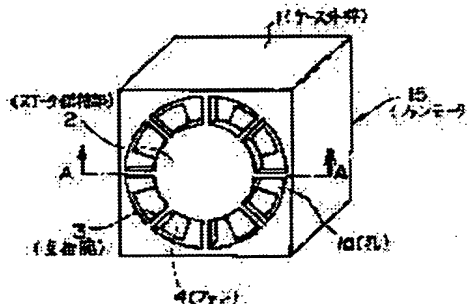
(72)Inventor : EGAWA YOSHIHIRO
SHINOSAWA HIDETOSHI

(54) FAN MOTOR WITH HEAT SINK FUNCTION

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a fan motor with a heat sink function which can efficiently radiate heat generated by semiconductor components such as a CPU using heat conduction and which can also exhaust air in a case where an electronic component is stored.

SOLUTION: An outer frame 1 of a case is formed of heat conductive material such as aluminum. A stator holding section 2 is fixed to the outer frame 1 of a case by a plurality of supporting arms 3 made of heat conductive material. When a rotor turns, a fan 4 exhausts an air flow and heat generated by a heat generating component which is thermally connected to the outer frame 1 of a case is carried to the supporting arms 3 through the outer frame 1 of a case. Then, the supporting arms 3, serving as fins of a heat sink, cools the outer frame 1 of a case.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's

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decision of rejection]

[Date of extinction of right]

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Bibliography

- (19) [Country of Issue] Japan Patent Office (JP)
(12) [Official Gazette Type] Open patent official report (A)
(11) [Publication No.] JP,10-66305,A
(43) [Date of Publication] March 6, Heisei 10 (1998)
(54) [Title of the Invention] A fan motor with a heat sink function
(51) [International Patent Classification (6th Edition)]

H02K 9/06
H01L 23/36
H02K 9/02
9/22

[FI]

H02K 9/06 C
9/02 B
9/22 Z
H01L 23/36 Z

[Request for Examination] Un-asking.

[The number of claims] 3

[Mode of Application] FD

[Number of Pages] 5

(21) [Filing Number] Japanese Patent Application No. 8-241065

(22) [Filing Date] August 23, Heisei 8 (1996)

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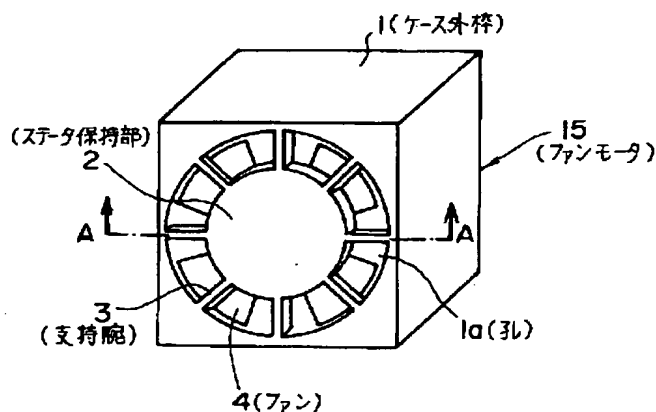
Summary

(57) [Abstract]

[Technical problem] The fan motor with a heat sink function which enabled it to also exhaust the air in a case in which electronic parts are held is offered at the same time it radiates heat efficiently in the heat which semiconductor parts, such as CPU ** which becomes a cooling system, generate using heat conduction.

[Means for Solution] The case outer frame 1 is constituted by thermally conductive material, for example, aluminum. The stator attaching part 2 is being fixed to the case outer frame 1 with two or more support arms 3 which consisted of thermally conductive material. While a fan 4 exhausts an airstream by rotation of Rota, the heat of the exoergic parts thermally combined with the case outer frame 1 conducts a case outer frame, the support arm 3 is reached, and the support arm 3 plays the role of the fin of a heat sink, and cools the case outer frame 1.

[Translation done.]



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CLAIMS

[Claim(s)]

[Claim 1] The fan motor with a heat sink function carry out consisting of two or more support arms which are characterized by to provide the following, and which used a thermally conductive material, making the aforementioned case outer frame conduct the heat of the exoergic parts which combined thermally on the aforementioned support arm while rectify and exhausting the flow of the airstream which made it generate by the fan of aforementioned Rota with the aforementioned support arm so that it may become parallel to motor shaft orientations, and cooling the aforementioned support arm by the aforementioned airstream as the feature The case outer frame which has a heat sink function using a thermally conductive material in the configuration of an abbreviation rectangular head of having a hole in the center section the above of the aforementioned case outer frame -- the stator attaching part which has been arranged at the hole and held the stator Rota attached in the aforementioned stator attaching part possible [rotation] It is prepared in the periphery edge of the aforementioned attaching part at one, and the cross-section configuration is a fixed inclination to the right-angled side of a motor shaft.

[Claim 2] The aforementioned thermally conductive material is a fan motor with a heat sink function according to claim 1 which is aluminum or copper.

[Claim 3] It is the fan motor with a heat sink function according to claim 1 which prepares the extension which comes to extend the one or more sides of the aforementioned case outer frame to motor shaft orientations, and is characterized by constituting the aforementioned extension with a thermally conductive material or a heat pipe.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the fan motor with a heat sink function in consideration of also exhausting the airstream in a case while radiating heat soon in semiconductor parts, such as CPU **.

[0002]

[Description of the Prior Art] A problem arises about a temperature rise with high-density-assembly-izing of highly-efficient-izing of a carried type personal computer, and parts. One of them is the temperature rise of each part article by self-generation of heat of each part article held in the case itself. It is the rise of the temperature within a case by generation of heat of the heat which each part article furthermore emits within a case, and a built type peripheral device. In the case of the former, the method of diffusing heat using a heat sink, a heat pipe, and heat-conducting characteristic case material is devised. Moreover, in the case of the latter, the structure exhausted by the small fan motor is adopted.

[0003]

[Problem(s) to be Solved by the Invention] There are increase of the calorific value of each part article by highly-efficient-izing in a carried type personal computer and a upward tendency of internal temperature, and it is becoming impossible however, to correspond increasingly from now on only by using a heat sink and heat-conducting characteristic case material as mentioned above, or using the small fan motor for the exhaust air within a case. Then, the appearance of a small, highly efficient, and cheap cooling system is demanded. The technical problem of this invention is to offer the fan motor with a heat sink function to which the air in a case in which electronic parts are held at the same time it radiates heat efficiently using heat conduction also enabled it to exhaust simultaneously the heat which semiconductor parts, such as CPU ** used as the candidate for cooling, generate.

[0004]

[Means for Solving the Problem] In order to solve the aforementioned technical problem, the fan motor with a heat sink function by this invention The case outer frame which has a heat sink function using a thermally conductive material in the configuration of an abbreviation rectangular head of having a hole in the center section, the above of the aforementioned case outer frame - it being arranged at a hole and with the stator attaching part which held the stator It is prepared in Rota attached in the aforementioned stator attaching part possible [rotation], and the periphery edge of the aforementioned attaching part at one. The cross-section configuration consists of two or more support arms which have a fixed inclination to the right-angled side of a motor shaft and which used a thermally conductive material. While rectifying and exhausting the flow of the airstream which made it generate by the fan of aforementioned Rota with the aforementioned support arm so that it may become parallel to motor shaft orientations, it constitutes so that the aforementioned support arm may be made to conduct the heat of the exoergic parts thermally combined with the aforementioned case outer frame and the aforementioned support arm may be cooled by the aforementioned airstream. The aforementioned thermally conductive material can consist of aluminum or copper. The extension which comes to extend the one or more sides of the aforementioned case outer frame to motor shaft orientations can be prepared, and a thermally conductive material or a heat pipe can constitute the aforementioned extension.

[0005]

[Function] According to the above-mentioned composition, the exoergic parts combined with the case outer frame are conducted on a support arm from a case outer frame by heat conduction, and are cooled by the exhaust stream with exhaust air. Therefore, since exoergic parts are cooled simultaneously with the exhaust air in a case, heat can be efficiently radiated in the exhaust air in a case, and generation of heat of each part article, and a small, highly efficient, and cheap fan motor can be realized.

[0006]

[Embodiments of the Invention] Hereafter, with reference to a drawing, the gestalt of operation of this invention is explained in detail. The perspective diagram showing the gestalt of operation of the fan motor with a heat sink function according [drawing 1] to this invention and drawing 2 are the side elevations having shown a part of drawing 1 in the cross section. The case outer frame 1 is a square core-box configuration, for example, a thermally conductive good material of the aluminum, copper, etc. is used. The stator attaching part 2 which held the stator in hole 1a of the center section of the case outer frame 1 is arranged, and the stator attaching part 2 is being fixed to the case outer frame 1 with eight support arms 3 formed in one. Thermally conductive material, such as aluminum and copper, is used like [the support arm 3] the case outer frame 1.

[0007] Rota 5 is supported by the stator attaching part 2 possible [rotation]. A fan 4 discharges an airstream in the direction of an arrow of drawing 2 by rotation of Rota 5. By combining thermally the semiconductor parts which should be cooled to the case outer frame 1, the heat emitted from semiconductor parts conducts the case outer frame 1, and reaches the support arm 3. The duty of the fin in the heat sink function of the case outer frame 1 is achieved, it is cooled by the airstream by the fan 4, and the support arm 3 emits the heat from

the case outer frame 1.

[0008] Drawing 3 is drawing showing the cross-section configuration of a fan and a support arm, and its physical relationship. It is made physical relationship and a cross-section configuration as shown with the support arm 12 which is the fan 11 and stationary blade which are a bucket in drawing. The flow of an airstream is generated in the direction of an arrow 14 to the hand of cut of Rota, and it is bent in the direction 13 almost parallel to the shaft orientations of a motor with the support arm 12. The angle theta to the right-angled side of a motor shaft can adjust the air capacity. By setting the cross-section configuration of such a fan 11 and the support arm 12, and the support arm 12 as a predetermined angle, the flow of a wind can be improved and a fan's property can be improved 15 to 30%.

[0009] Drawing 4 is the property view showing the relation of the static pressure-air capacity of the stationary-blade structure in this invention, and the usual motor. A and B are the property views of the stationary-blade structure of the fan motor with a heat sink function by this invention, and C is the property view of the conventional motor. He can understand that air capacity is large to the same static pressure from the property C of the motor of the former [direction / of the stationary-blade structure of A and B] so that clearly from drawing 4.

Drawing 5 is drawing showing the example of use of the fan motor with a heat sink function of drawing 1. It is attached so that the motor 15 of drawing 1 may discharge the air within a case in the direction of an arrow on the whole surface of the computer case 8. The end of the heat conductive treadway 6 is thermally combined with the inferior surface of tongue of the case outer frame of a motor 15, and the exoergic parts 7 are thermally combined with the other end.

[0010] While performing the exhaust air within the personal computer case 8 which is the purpose of fan motor original, the heat which the exoergic parts 7 emit can be cooled by conducting the heat conductive treadway 6 like an arrow 10. Conventionally, the comparatively larger heat sink which was required for the exoergic parts 7 becomes unnecessary, and partial cooling and exhaust air of it are attained efficiently.

[0011] Drawing 6 is the perspective diagram showing the gestalt of other operations of the fan motor with a heat sink function by this invention. The gestalt of this operation extends the outer frame extension 20 for the lower side of the case outer frame 16 in parallel with a motor shaft. It enables it to combine exoergic parts with the point of the outer frame extension 20 thermally, as drawing 5 showed. Other components, such as the stator attaching part 17, the support arm 18, and a fan 19, are the same as drawing 1. The long slots 20a and 16a are formed in the outer frame extension 20 and the case outer frame 16, and the thermolysis effect is further heightened by increasing the surface area of these outer frame extension 20 and the case outer frame 16. With the gestalt of the above-mentioned implementation, although a thermally conductive material is used for the outer frame extension 20, you may use a heat pipe.

[0012]

[Effect of the Invention] As explained above, this invention is the configuration of an abbreviation rectangular head of having a hole in the center section. The case outer frame which has a heat sink function using a thermally conductive material, and the stator attaching part which has been arranged at the hole of a case outer frame and held the stator, It is prepared in Rota attached in the stator attaching part possible [rotation], and the periphery edge of an attaching part at one. The cross-section configuration consists of two or more support arms which have a fixed inclination to the right-angled side of a motor shaft and which used a thermally conductive material. By making a support arm conduct the heat of the exoergic parts thermally combined with the case outer frame while rectifying and exhausting the flow of the airstream which made it generate by the fan of Rota with a support arm so that it may become parallel to motor shaft orientations, and cooling a support arm by the airstream The fan motor which has highly efficient (efficient) exhaust air and a heat sink function small is realizable.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective diagram showing the gestalt of operation of the fan motor with a heat sink function by this invention.

[Drawing 2] It is the side elevation having shown a part of drawing 1 in the cross section.

[Drawing 3] It is drawing showing the relation between a stationary blade and a bucket.

[Drawing 4] It is usually the property view of the static pressure-air capacity of a motor with a stationary-blade structure motor.

[Drawing 5] It is drawing showing the example of use of the fan motor with a heat sink function of drawing 1.

[Drawing 6] It is the perspective diagram showing the gestalt of other operations of the fan motor with a heat sink function by this invention.

[Description of Notations]

- 1 16 -- Case outer frame
- 2 17 -- Stator attaching part
- 3, 12, 18 -- Support arm
- 4, 11, 19 -- Fan
- 5 -- Rota
- 6 -- Heat conductive treadway
- 7 -- Exoergic parts
- 8 -- Computer case
- 15 -- Fan motor
- 20 -- Outer frame extension

[Translation done.]

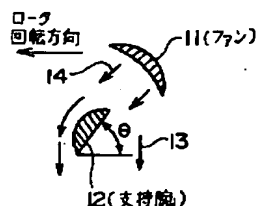
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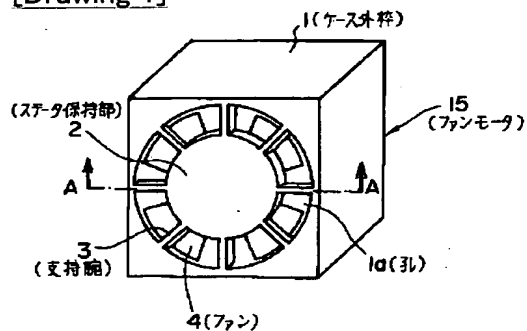
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DRAWINGS

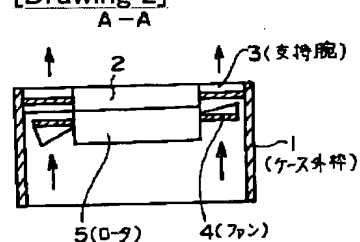
[Drawing 3]



[Drawing 1]

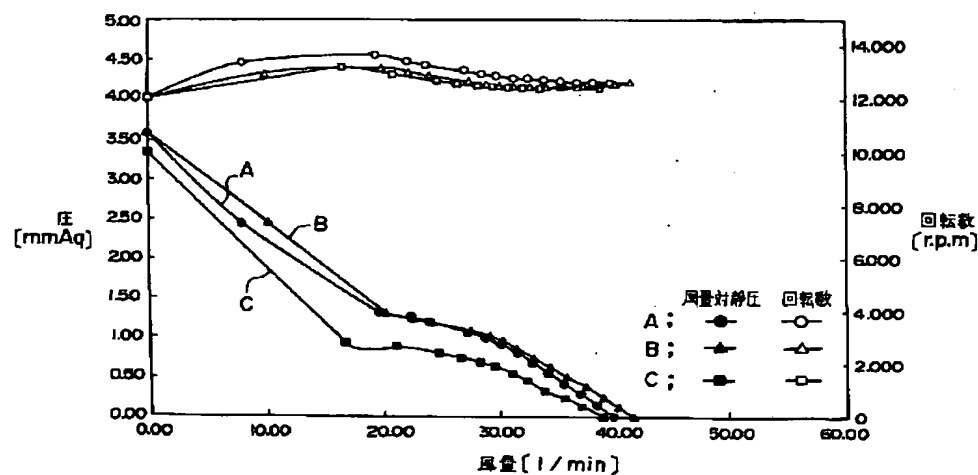


[Drawing 2]

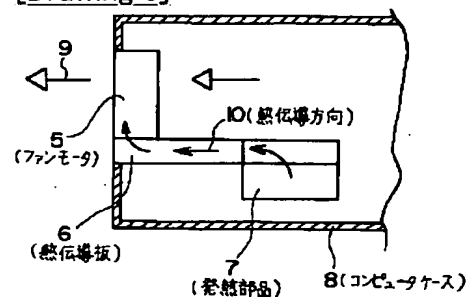


[Drawing 4]

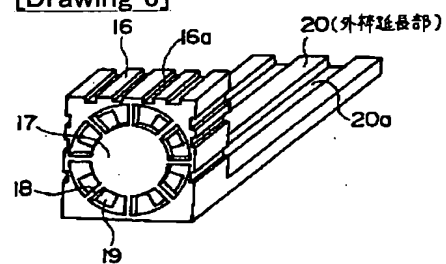
風量-静圧特性



[Drawing 5]



[Drawing 6]



[Translation done.]